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EDITORIAL.

Manuring of Oil Palms.

Progress reports of experiments on the manuring of oil palms have been published from time to time in the pages of this journal and have shewn that under the conditions of the particular experiments, the annual manuring of palms from the age of about 7 years with rock phosphate, is an economic proposition. Similar experiments by another authority have confirmed these results and indicated that a response to this system of manuring may be expected over a wide range of Malayan inland soils.

In the present issue we include a report on further observations of these experiments. The figures shew a marked falling off in yields if the land is not manured regularly, and a lack of response—not fully explained—when the palms are again manured after a period of three years without manuring.

While the results to-date conclusively demonstrate the value of manuring with rock phosphate at regular intervals, the value of applying a more complete manure at longer intervals is not yet assessed. Until more conclusive results have accrued on this point, planters are advised, as a measure of insurance, to apply a complete fertilizer every third year from the time the palms are twelve years old.

"Dwarfs v Talls."

A memorandum included in this number places on record the history in Malaya of the cultivation of dwarf coconuts and briefly states the present recommendations of the Department as to the advisability or otherwise of cultivating this type.

In the past, the high yields obtained from "dwarfs" on certain estates appeared to support the contention that the planting of this type would be more remunerative than planting "talls." As a result of more recent investigations, however, it appears that "dwarfs" are more sensitive to unfavourable soil and water conditions than the tall palm. Although very remarkable yields are obtainable if conditions are ideal, in most instances yields are only fair or are poor because the conditions do not fulfil the exacting requirements of the dwarf palm.

Cashew Nuts in Malaya.

To those of our readers who are conversant with the east coast of Malaya—Pahang, Kelantan and Trengganu, the cashew nut tree will require no introduction, it is commonly found in these districts although it is seldom cultivated.

Efforts have been made from time to time to commercialize the industry, but to-date, all such attempts have failed owing to the fact that the trees are generally scattered, there is difficulty in obtaining a good quality raw product and the local inhabitants are unable to prepare the nuts in a form suitable for the market.

There is, however, a market for cashew nuts and the difficulties enumerated above are not insuperable.

Included in this number we publish an abstract of an article on the cashew nut industry in Southern India. The methods used in India may be taken as a model, for it is from India that the bulk of world supplies are obtained.

In another paper* the author points out that the tree flourishes under varying soil and rainfall conditions in Ceylon. It is found on laterite and on white quartz sand under a rainfall of about 80 inches, distributed during two monsoons, while in another area it grows on coastal sand with a north-east monsoon during which most of the rainfall of about 40 inches is received. In Ceylon, therefore, the tree grows on the poorest soil unsuited to most other crops, and withstands drought. It has come to be regarded as a wasteland crop and can well be extended in most parts of the dry zone without irrigation.

We have made enquiry regarding the cashew nut tree in Pahang and Kelantan. In Pahang it is nowhere abundant and is never cultivated; in the two coastal districts of Pekan and Kuantan there are estimated to be about 1,700 trees. In Kelantan the tree is commonly found throughout the coastal plain, where it grows on a wide range of soils. It is noteworthy as one of the few plants of economic value which do well on the infertile sandy soils of the coastal belt. The annual rainfall on the east coast is over 100 inches, nearly half of which is precipitated during the north-east monsoon in the last three months of the year. Normally there is but one crop a year, between April and June. The yield varies between 200 and 1000 fruits per annum according to age and vigour of the tree, but 500 fruits a year can be taken as a fair average figure.

We have occasionally received enquiry from the east coast regarding the preparation and marketing of the nut. Hitherto, we have experienced no difficulty in finding a local market for the product, but the nuts have never been delivered. This has probably been due to the difficulty in organizing collection and lack of knowledge of the preparation of the nut. The statement of the methods used in India may focus attention on the potential value of this crop and serve as a guide to renewed attempts to establish the industry.

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* Sessional Paper V—1937. 11.-The Cashew Nut Industry of South India, by W. R. C. Paul. March 1937. To be purchased at the Government Record Office, Colombo, Ceylon, price 10 cents (Ceylon currency).

Original Articles.

MANURIAL EXPERIMENTS ON OIL PALMS

BY

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An account has been published in *The Malayan Agricultural Journal** of the results of experiments on the manuring of oil palms on Block 5D at Serdang and on two estates up to July 1935. The present article brings those records up to date (December 1937).

Estate A.

The article quoted showed that the manures were applied to the experimental plots on this estate at 6-monthly intervals from July, 1930, to 1932, after which no manure was applied until July 1935. Applications were withheld for 3 years in order to find the duration of effect of application. Actual findings will be discussed later. In July, 1935, an attempt was made to ascertain the best method of application of fertilizer by applying rock phosphate to all these palms in three different ways—(a) broadcast, (b) cover (grass and weeds) cleared to just beyond the spread at the time of application, manure turned in to a depth of three or four inches and the aisle kept clear and (c) as in (b) but undergrowth allowed to grow after application of the fertilizers crossing the previous treatments. No differences emerged as a result of these new treatments, but the poor all-round response obtained makes it impossible to draw definite conclusions. Yields are given in Tables I and II.

Table I.

Yield in Pounds of Fruit Bunch per Mature Palm on Quartzite Hill Soil.

Estate A. Palms planted 1922.

Treatment to July 1932.	No. of Mature Palms.	1929	1930	1931	1932	1933	1934	1935	1936	1937
*NPK	36	101	148	234	259	286	198	138	154	130
NPK + Mg	17									
PK	40	71	118	199	240	247	187	129	146	127
PK + Mg	19									
P	37	86	148	240	246	257	209	136	135	143
P + Mg	17									
Control	53	90	177	167	181	185	141	114	145	128
Mean		88.5	147.8	210.0	231.5	242.2	184.0	129.2	145.0	132.0

* Vol. XXV No. 7 July 1937.

* The reasons for averaging these treatments are given in the *Malayan Agricultural Journal* for 1935, page 323.

Table II shews these results calculated as a percentage of the controls.

Table II.

Yields Expressed as Percentage of the Controls.

Estate A.

Treatment to July 1932.	1929	1930	1931	1932	1933	1934	1935	1936	1937
NPK ...	112.2	83.6	140.1	143.1	154.6	140.4	121.1	106.1	101.6
PK ...	85.6	66.7	119.2	132.6	133.5	132.6	113.2	100.6	99.2
P ...	95.6	83.6	143.7	135.9	135.7	148.2	119.5	93.5	111.7
Control ...	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

There are three possible explanations of lack of response to the 1935 treatment: (i) that the general health of the palms has deteriorated to such an extent following three years without fertilizer, that a single application of phosphate was insufficient, (ii) that the palms had reached the stage at which phosphate alone was insufficient and a more complex manurial mixture was needed, (iii) that palms on hill quartzite soil deteriorate at about 14 years from planting. Possibly (iii) is rendered improbable by the continued good yield of other palms on the same estate which have received phosphate manures for the past three years; visual examination of the experimental palms gives the impression that although not actually unhealthy they are suffering from some deficiency, but it is impossible to say whether the probability of (i) or (ii) is the greater. It has been decided to abandon for the present the attempt to ascertain the best method of application and to revert to the old layout—applying as treatments NPK, NP, PK and P. This should in the course of two years provide much needed information.

Table III.

Mean Number of Bunches per Palm. Estate A.

Treatment to July 1932.	1929	1930	1931	1932	1933	1934	1935	1936	1937
NPK ...	5.8	6.1	8.9	9.2	8.8	5.9	4.2	4.1	4.6
PK ...	4.6	5.8	8.9	9.1	8.3	6.2	4.8	4.8	4.6
P ...	4.9	7.9	10.6	9.7	8.7	7.2	5.8	5.0	4.7
Control ...	5.6	7.4	7.6	7.9	6.9	5.1	4.3	5.2	5.0

Table IV.

Mean Weights of Unit Bunches, Estate A.

Treatment to July 1932.	1929	1930	1931	1932	1933	1934	1935	1936	1937
NPK ...	17.4	24.3	26.3	28.2	32.6	33.7	32.8	37.5	28.3
PK ...	16.7	20.4	22.3	26.4	29.8	30.1	26.9	30.2	27.6
P ...	17.6	18.7	22.6	25.4	28.9	29.3	23.5	27.0	30.5
Control ...	16.2	23.9	21.9	23.9	27.0	27.6	26.7	27.9	25.6

It will be seen from Tables III and IV that the fall in the yield in the last three years is due to fall in the number of fruit bunches produced and not to decrease in weight of individual bunches.

Serdang (5D).

The manurial layout on the experimental area at the Central Experiment Station at Serdang was altered somewhat in the period under review.

The manures put down in 1932 were per palm

A.	NPK	2 lbs. Calcium Cyanamide
		6 lbs. Rock Phosphate (30 per cent. P_2O_5)
		2 lbs. Kainit
B.	N P	2 lbs. Calcium Cyanamide
		6 lbs. Rock Phosphate
C.	P (Rock)	6 lbs. Rock Phosphate
D.	P (Basic)	6 lbs. Basic Slag
E.	Control	

There was thus a comparison between NPK, NP, P, and also of basic slag against the cheaper rock phosphate.

Results showed that there was little or no difference between the two kinds of phosphate and that phosphate alone was sufficient. For the same reason as on Estate A, i.e. to determine duration of benefit from fertilizer no manure was applied in 1933 and 1934. In 1935 when yields were falling rapidly, the following programme was laid down:—

A. NPK in 1935 with P every year, N every other and K every third year.
B. P (rock phosphate) every other year.
C. P (,, ,,) every year.
D. P (rock phosphate dust) every year.
E. Control.

This programme was based on the finding that P alone had proved necessary and sufficient in 1932, but that as the palms grew older there was the possibility that a complete mixture would be necessary. Results are given in Tables V to VIII and Graph 2 and show as for Estate A a general fall of yield. Unfortunately, deductions other than the necessity for phosphate cannot be made because of the appearance of "bronzing" leading to "wilt" which is distributed throughout all plots and has undoubtedly led to a reduction in yield which may or may not have unequally and partially counterbalanced increases due to manures—as an example the higher yield from the "B" plots (NP) in 1936 and 1937 cannot with any degree of probability be ascribed to a single application of N in 1932.

In an endeavour to counteract the then incipient "bronzing" the manurial programme was modified in 1937 to the following:—

A. NPK in 1937, thereafter P every year and NK in addition every other year.
B. NP in 1937, thereafter P every year and N every other year.
C. Rock phosphate every year.
D. ,, ,, dust every year.
E. Control.

Dressings applied in 1937 could not have affected yields in that year and hence have been omitted from tables.

As a further experiment, the plots have been split and compost applied to 15 of the 30 trees in each plot. It is to be noted that throughout this experiment "NPK" has included magnesium as the potash was applied in the form of kainit.

The same troublesome factor, "bronzing and wilt," has spoilt the value of an interesting series of observations on the effects of artificial pollination combined with manuring. On "pollinated" palms ten bunches per annum were pollinated, on "unpollinated" none. Yields are given in Tables IX and percentages of cleaned fruit from different sources in Table X.

Table V.

Mean Yields in pounds of Fruit Bunches per Palm at the Central Experiment Station, Serdang, Block 5D.

Treatment	No. of Palms	July-Dec. 1932.	Calculated yield 1932	1933	1934	Treatment	1935	1936	1937
NPK A ...	150	95.9	201.2	224.8	201.1	NPK ...	204.6	132.6	177.0
NP B ...	150	64.3	137.8	170.4	182.5	P (alternate)	183.3	142.0	156.1
P (Rock) C ...	150	67.7	155.4	176.4	163.0	P (annual)	162.6	101.3	124.0
P (Basic) D ...	150	67.5	166.0	163.9	155.6	P (dust) ...	155.3	106.0	139.1
Control E ...	150	67.3	162.8	124.1	115.7	Control ...	116.0	86.6	85.8

Table VI.

Yields Expressed as percentage of Controls - Block 5D.

Treatment	July-Dec. 1932	1933	1934	Treatment	1935	1936	1937
N P K ...	142.5	181.0	173.9	N P K ...	177.0	153.1	206.2
N P ...	95.5	137.1	147.8	P (alternate) ...	158.2	163.8	177.8
P (Rock) ...	100.7	142.1	141.0	P (annual) ...	140.1	117.0	144.6
P (Basic) ...	100.4	132.0	134.5	P (dust) ...	134.0	122.2	162.3
Control ...	100.0	100.0	100.0	Control ...	100.0	100.0	100.0

Table VII.

Number of Bunches per Palm. Serdang Block 5D.

Treatment	July-Dec. 1932	1933	1934	Treatment	1935	1936	1937
N P K ...	5.4	10.2	8.7	N P K ...	6.4	9.3	7.8
N P ...	4.1	9.1	9.3	P (alternate) ...	7.5	9.6	7.6
P (Rock) ...	4.7	9.7	8.8	P (annual) ...	5.8	8.5	6.8
P (Basic) ...	4.5	7.6	8.6	P (Dust) ...	6.1	9.6	7.6
Control ...	4.9	7.7	6.8	Control ...	5.1	7.5	5.4

Table VIII.

Weight in pounds of Unit Bunches per Palms. Serdang Block 5D.

Treatment	July-Dec. 1932	1933	1934	Treatment	1935	1936	1937
N P K ...	17.9	21.1	24.2	N P K ...	31.9	14.2	22.7
N P ...	15.9	18.7	20.4	P (alternate) ...	24.4	14.8	20.6
P (Rock) ...	14.4	18.2	18.5	P (annual) ...	21.6	11.9	15.9
P (Basic) ...	15.0	19.1	18.1	P (dust) ...	25.4	11.1	18.3
Control ...	13.7	16.1	17.0	Control ...	22.7	11.6	15.9

It will be seen from the above that there has been a falling off in yield on Block 5D after the cessation of manuring, but whereas in the case of Estate "A" there has been chiefly a decrease in the number of bunches, on 5D in 1936 there was a fall in the weight of bunches rather than in numbers.

Artificial Pollination on Block 5D Serdang.

As stated in the *Malayan Agricultural Journal* for 1935 page 329, artificial pollination was only properly carried out from 1934 onwards. The available figures are given in Table IX.

Table IX.

Total Yields in lbs. from Pollinated and Unpollinated Palms. Block 5D Serdang.

	1935		1936		1937 (to Sept.)		Total	
	Pollinated	Control	Pollinated	Control	Pollinated	Control	Pollinated	Control
N P K ...	10,883	9,017	14,464	16,163	10,256	10,110	35,603	35,290
P (alternate) ...	12,688	8,608	13,874	13,551	9,436	8,168	35,998	30,327
P (annual) ...	9,366	5,867	10,638	12,209	6,935	7,143	26,939	25,219
P (dust) ...	9,498	6,334	12,415	12,238	8,434	7,806	30,347	26,378
Control ...	7,231	5,866	8,225	9,263	5,050	5,308	20,506	20,437
Total ...	49,666	35,692	59,626	63,424	40,061	38,535	149,393	137,651
Mean ...	9,933	7,138	11,925	12,685	8,015	7,707	29,879	27,530

Statistical examination shewed that the differences between the yields from the pollinated and unpollinated palms is not significant, a fact which can be seen by a casual inspection of the above table.

Although the pollinated bunches consistently shew a higher percentage of fruit than the unpollinated bunches from the same palms or bunches from the control palms, these differences are not significant. The gradual decrease in the differences are of interest and suggest possibly shortage of plant foods became the limiting factor in the latter years. In view of the figures obtained and the increasing difficulty and expense with increasing height it is not proposed to continue pollination work on Block 5D.

Table X.

Mean percentages of Cleaned Fruit from Pollinated, Unpollinated and Control Bunches. Serdang Block 5D.

	"Pollinated" Palms		"Unpollinated" Palms	
Year	Pollinated bunches	Unpollinated bunches	Unpollinated	Mean
1935	65.5	50.8	52.8	56.4
1936	63.9	58.6	60.7	60.1
1937	69.1	62.2	66.4	65.9
Mean	66.2	59.9	63.3	61.2

Young Palms. Estate C.

The previous article gave the history of the young palms on Estate C. They were planted in December 1929, were first manured in July 1932 and thereafter at six monthly intervals until February 1934. They were manured again in July 1935 and this will be repeated in July 1938.

Table XI

Mean Yield per Palm in lbs of Fruit Bunches from Young Palms Estate C.

Treatment	Nov. 1932 to Dec. 1933	Calculated 1933	1934	1935	1936	1937
N P K ...	163	151	214	291	311	289
N P ...	166	154	201	274	326	299
P ...	159	147	190	246	260	260
N ...	134	125	191	249	265	223
Control ...	144	134	184	260	249	251

Random Error	52.9	33.7
"P" (.05) difference in lbs. for significance	68.4	43.6
"P" (.10) ,, ,, ,, ,, ,,	60.4	38.4

Table XII.

Yields expressed as Percentages of the Controls. Estate C.

Treatment	Nov. 1932 to Dec. 1933	1934	1935	1936	1937
N P K ...	113.2	116.7	111.9	124.7	115.1
N P ...	115.2	109.4	105.4	130.9	119.1
P ...	110.5	103.4	94.6	104.4	103.6
N ...	93.0	103.9	95.7	106.4	88.8
Control ...	100.0	100.0	100.0	100.0	100.0

Table XIII.

Number of Bunches per Palm. Young Palms Estate C.

Treatment	Nov. 1932 to Dec. 1933	1934	1935	1936	1937
N P K ...	14.7	12.6	12.4	12.5	10.3
N P ...	14.7	10.5	12.0	12.2	10.2
P ...	13.2	10.8	10.7	10.3	8.8
N ...	14.3	11.2	10.7	10.3	8.4
Control ...	13.2	11.1	12.2	9.9	8.6

Table XIV.

Weight in lbs. of Unit Bunches per Palm. Young Palms Estate C.

Treatment	Nov. 1932 to Dec. 1933	1934	1935	1936	1937
N P K ...	11.1	17.0	23.5	24.9	28.1
N P ...	11.3	19.1	22.8	26.9	29.3
P ...	12.0	17.6	23.0	25.3	29.5
N ...	9.4	17.1	23.2	25.8	26.8
Control ...	10.9	16.6	21.3	25.2	29.2

These results indicate that a combination of nitrogen and phosphate is beneficial to young palms, although at the present price of oil, profit is dubious. It may be, however, that expenditure on early manuring will be repaid in later years.

General Conclusions.

For reasons given it is impossible to draw any reliable deductions from the later stages of the experiment at Serdang. From the Estate A it may be concluded that the effect of a manurial application of phosphate ceases after 18 months and since the results of an application are not manifested before 9 to 18 months (earlier papers) it follows that applications of phosphate should be annual from approximately the 7th. year. It is still impossible to say whether nitrogen, potash, or magnesium are necessary from the 13th. year.

As an insurance measure it would seem wise to apply a complete mixture, including magnesium, at every third year from the twelfth year until more definite results are available.

Application of nitrogen and phosphate has given an increased return from young palms but time is necessary to show whether this will be commercially profitable.

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DWARF COCONUTS IN MALAYA.

Memorandum prepared by the Research Branch of the Department of Agriculture, S.S. and F.M.S. in connexion with the visit to Malaya of Sir Frank A. Stockdale, K.C.M.G., C.B.E., Agricultural Adviser to the Secretary of State for the Colonies.

As they exist in Malaya, dwarf coconuts may be broadly divided into three main varieties—yellow, red and green. The yellow variety is the most common and exhibits a number of gradations shading into red and green. The green variety, in particular, seems prone to "throw" a proportion of semi-tall palms. Varieties have been described by Handover* and Jack and Sands.†

The origin of dwarf coconuts is doubtful; Handover suggests they are mutant of "talls" appearing probably in Java, while Jack and Sands are satisfied that there is no identity with the king coconut of Ceylon. It is generally supposed that dwarfs were first introduced into Malaya between 1890 and 1900 by Javanese and Banjarese padi planters in Krian, Perak, but a quotation by Winstedt from Malayan Folklore speaks of the "Golden coconut only to be found in princes' gardens"; this suggests far earlier importation into the Peninsula.

Until 1912 the palms were grown by Malays for the sake of the fresh fruit and the possibility of copra manufacture was not considered. In that year Handover collected seed from Parit Buntar and planted 500 acres at Sungei Nipah in the Sepang District of Selangor, in 1919 he published the article mentioned above which directed attention to their commercial possibilities. In that article it was claimed that the advantages offered by dwarfs, *viz* denser planting, earlier maturity and easier harvesting counterbalanced the disadvantages of smaller nuts. As a result of observations on isolated mature trees and on Sungei Nipah in the 1st. and 2nd. years of production (4th. and 5th. years from planting) Handover estimated a yield of 21½ piculs of copra (1 picul = 133 1/3 lbs.) per acre per annum in the 9th. year from planting. It was also stated that dwarfs appeared to be exceedingly hardy and would grow well on white clay, red loam or deep peat—in fact, in any situation where water is abundant, yet not stagnant, "though it is evident that well drained alluvium suits it best". As a result of this article a number of estates laid down areas of dwarfs, generally small, but reaching 762 acres in one case (on peat). In general, a mixture of the three main varieties was planted, with yellow predominating. In 1929, Jack and Sands published another article‡ describing observations made on eighteen trees planted in 1921 around the Departmental Office at Parit Buntar, Krian. From yields of these palms and from records of estates, an estimate of 13 to 17 piculs of copra from dwarfs growing under favourable conditions were made. Subsequently it became clear that dwarfs were not hardy and that although "under favourable conditions" they were capable of exceedingly high yields, the limits of such conditions were very narrow. Further,

* The Dwarf Coconut. *Malayan Agricultural Journal* Vol. VII No. 5, 1919.

† The Dwarf Coconut in Malaya. *Malayan Agricultural Journal,* Vol. X No. 1. 1922.

‡ Observation on the Dwarf Coconut Palm in Malaya. *Malayan Agricultural Journal,* Vol. XVII No. 2. 1929.

Cooke experienced more difficulty in preparing copra of the highest quality from dwarfs than from talls. Accordingly, in 1933, an article by Cooke and Jagoe§ was published drawing attention to these facts.

Present Position.

In connexion with the present memorandum a questionnaire was sent to estates known to have planted dwarfs to the extent of 20 acres or more. Replies are summarized in Appendix A. No new facts have been elicited from the replies to this questionnaire; it is clear that under Malayan conditions, dwarfs are unsuited to peat soil and without irrigation, will not yield commercial crops on light or medium mineral soils. Very heavy soil *per se* is also insufficient for heavy yield as witness the Coconut Experiment Station, Port Swettenham, where the soil is peculiarly intractable and where yields range from 30 to 60 nuts per palm per annum, equivalent to $5\frac{1}{2}$ to 11 piculs of copra per acre. If there were any probability of considerable extension of coconut planting locally the precise conditions governing success could doubtless be determined by detailing a Soils Chemist intensively to study the problem, but this does not seem to be called for at present. Departmental advice is that dwarfs should not be planted on light soil, or in dry situations and that in the first instance, experimental areas of 2 to 5 acres should be laid down.

No serious complaints against quality of copra have been received as a result of the questionnaire; the explanation may be that Cooke's adverse comment applied to preparation of super-grade copra and not to that of ordinary commercial standards.

It is unfortunate that the yellow type predominates on Malayan estates, since it requires the greatest number of nuts to make a picul of copra. Jack and Sands in their second paper give the following figures as averages:

Yellow	—	508 nuts per picul
Red	—	453 ,, ,, ,,
Green	—	407 ,, ,, ,,

The yellow type has also proved to be least resistant to unfavourable soil conditions. The red type produces particularly poor copra. The green type should undoubtedly have preference in spite of its less uniform progeny on account of hardiness and size of nut.

It is generally assumed in Malaya that dwarfs are self-pollinated and therefore are now genetically pure (with the exception of green "throws"). The appearance of families from single mother palms at the Coconut Experiment Station, Port Swettenham, supports this view, but yield records of these families present a very different picture; the coefficient of variability of the seven best families being as follows:—

§ Further Observations on the Dwarf Coconut Palm in Malaya. *Malayan Agricultural Journal*, Vol. XXI, No. 4, 1933.

No.	Family.	Mean Yield Nuts per annum	No. of palms	Coefficient of variability per cent.
121	Red ...	60.2	22	12.1
122	Yellow ...	54.2	22	36.0
123	„ ...	51.6	22	41.5
124	Green ...	37.2	17	74.0 (excluding semi-talls)
125	„ ...	41.5	20	39.7
138	„ ...	51.6	15	14.7
137	„ ...	43.7	14	25.7

It will be seen that only two families Nos. 121 and 138 exhibit uniformity of yield and the conclusion must be, either that yield is not predominantly a genetic character or that the palms are not genetically pure.

Appendix A.

Estate	Area planted	Type of soil and drainage	Cover	Date of planting	Varieties	Palms per acre	Nuts per acre	Yield of copra per acre	Cost per picul of copra of harvesting and preparation	Remarks.
	acres							piculs	$	
A	700	Varies from stiff clay to light loam well drained.	Mixed	1912-1927	Mixed	90 & 99	*1933* 3012 *1937* 1800	6.2* 3.8*	84 cents	This is the property on which the estimate of 21 piculs per acre was based. It has suffered from neglect but 10 piculs is probably its maximum capacity.
B	100	One of the early areas—no reply to questionnaire—dwarfs said to have been cut out as failures Soil, probably loam.								
C	125	No reply. Visited about 4 years ago—soil loam—yield probably 4-5 piculs.								

* Calculated from nut yield at 480 nuts = 1 picul of copra.

Estate	Area planted	Type of soil and drainage	Cover	Date of planting	Varieties	Palms per acre	Nuts per acre	Yield of copra per acre	Cost per picul of copra of harvesting and preparation	Remarks.
								piculs	$	
D	227	40 acres heavy clay 80 acres clay 107 acres organic well drained. 4′ & 6′ drains every 4-5 chains Water table 4′ dry, 2′ wet weather.	Micania dug in twice a year or Centrosema dug once	1923	Yellow with few green	90	*1933* 3120 *1937* 3310	5.2 6.9	83 cents as against 51 cents for talls.	
E	119	?	?	1923	All kinds	109	3813	7.7	71 cents	
F	80	Peaty† 3′ drain every chain. Water table 1′ in wet weather	Clean ?	1921	Mixed	90		20	1.30	
G	100	Coastal clay not particularly heavy. 4′ drains every 120′ —running into 8′ drains 10 chains apart. Water table 2-3 feet	Centrosema	1921	All three. Yellow variety predominates	109	*1931-32* 1197 *1933-34* 1105 *1936-37* 1119	21.8 20.4 19.7	80 cents Tall palms 51 cents	Copra not as crisp as that from talls. Irrigation introduced 1937.
H	50	Very heavy, 6′ drains every 120′ (Aeration drains every row).	Mixed	1919	Mixed	109	*1933* 3600 *1937* 4100	7.4* 8.5*	72 cents (calculated from figures given)	Annual yield said to be more variable than talls.

* Calculated from nut yield at 480 nuts 1 picul of copra.

† Probably organic — not peat.

Estate	Area planted	Type of soil and drainage	Cover	Date of planting	Varieties	Palms per acre	Nuts per acre	Yield of copra per acre	Cost per picul of copra of harvesting and preparation	Remarks.
	acres							piculs	$	
I	702	Deep peat. Good drainage	Mixed	1924?	Yellow	109	*1933* 1600 *1935* 1200 *1937* 1700	— 2.3 4.0	72 cents	
J	165	Medium heavy, 30 acres light organic. 3′ drains every 60′-5′ leads to watergrade *Periodic irrigation.* Water table 3′ dry, 1½′ wet weather	Centrosema	1920	Mostly Yellow	90	*1933* 4764 *1935* 7848 *1936* 5545 *1937* 6970	7.63 12.45 8.79 11.07	86 cents against 64 cents for talls	Noticeably more variable than talls, apparently increased dislike to light soil.
K	41	Heavy loam alternate drains & irrigation channels every 88′.	Grass slashed	1920	Yellow	85	*1933* *1934* *1935* *1936* *1937*	25.9 23.6 27.0 20.2 27.4	62 cents *	

* Calculated from not every clear figures given.

THE GROWTH OF PEPPER ON LIVING SUPPORTS.

Prepared for publication by the staff of the Division of Agriculture, Straits Settlements and Federated Malay States.

In the Malay Archipelago the usual method of growing pepper (*Piper nigrum L.*) is to allow the vines to grow up hardwood supports. As it is usual to plant as many as 1,000 vines per acre, in order to establish a pepper plantation on a large scale a considerable supply of hardwood posts must be available. The supports require to be about 6 inches in diameter and about 14 feet long, thus allowing about 10 feet above soil level. If the cultivator does not have access to jungle land whence he can secure supplies, such posts will cost approximately 50 cents each or $500 per acre of planted pepper.

In countries such as India and Ceylon where pepper is cultivated, living standards are used. The tree selected is usually quick growing, deep rooted, able to withstand heavy and frequent pruning, and preferably leguminous. The trees most commonly used are dadap (*Erythrina sp.*), kapok (*Ceiba pentandra*), jack fruit, and mango. A leguminous tree which fulfils the above requirements in Malaya is *Gliricidia maculata*. It is readily propagated from cuttings 8 to 10 feet long which produce a luxuriance of succulent growth from the top of the cutting. The tops may be pollarded 3 or 4 times a year and will yield up to 15,000 pounds of green material which may be mulched on the surface of the soil.

At the Central Experiment Station, Serdang, in 1933, when a pepper manurial experiment was being designed, it was decided to duplicate the experiment on hardwood supports and on living supports of *Gliricidia maculata*. Rooted cuttings of pepper were planted against hardwood posts and Gliricidia during April, 1934, and the first manurial dressings were applied during September, 1935, when the plants were well established. Subsequent applications of manures were given in February, 1936, and February, 1937. During the course of the experiment the vines on the living supports of *G. maculata* were slower in establishing themselves and were slow in yielding compared with the vines on the hardwood supports. This may be partially due to the competition for the manurial dressings by the living supports. The following table gives the yields of green berries in lbs. per acre since the commencement of recording.

Means of Manurial Treatment.
Green Berries in lbs. per acre.

	1936		1937		Totals
	Mar./June	July/Dec.	Jany./June	July/Dec.	
Hardwood supports ...	740	1,031	2,193	1,694	5,658
G. maculata supports ...	47	5	588	464	1,104

Cuttings of Gliricidia may be purchased for 1½ cents each but could be propagated for considerably less and the cost of planting the cuttings would be approximately $20 per acre. With hardwood supports, in addition to the initial outlay of $500 per acre for the purchase of the posts, the setting of the posts in the ground is estimated to cost a further $25 to $30 per acre.

Received for publication 25th April, 1938.

SQUIRREL CONTROL IN KELANTAN

BY
R. G. HEATH,
State Agricultural Officer, Kelantan.

Squirrels are serious pests, more particularly of the coconut and fruit crops, throughout Malaya. It is possible that the measures successfully adopted in Kelantan to deal with this pest may usefully be adopted in other parts of the Peninsula.

In many parts of the Kelantan plain, damage by these pests has been effectively checked by means of control measures, organized in the first place by the villagers and subsequently extended by a measure of Government aid.

Shooting is the form of control normally practised. The control organization in each district or sub-district consists of a number of shooters, each being responsible for control work in a designated section. The shooters are nominated by the headman of the sub-district in consultation with certain Malay officials under him. The shooters provide their own guns and ammunition. They are recompensed by means of a levy, in cash or in kind, on all coconut and fruit holdings within the protected area. Levying is usually carried out by the local headmen. At present, individual sub-districts have their own ideas as to what constitutes a reasonable levy but it is hoped, in course of time, that the rates will be more standardized. The following are examples of the differing practices at present in vogue:—

Pendek.—For every coconut palm protected, the owner supplies either 3 nuts or a cash payment of 3 cents, while for every fruit tree, the fee is 20 cents. Levying normally takes place quarterly.

Panji:—For every coconut palm protected, the owner supplies 3 nuts or he may pay at the rate of $1 for every ten squirrels shot on his land. Payments are made monthly or every other month, depending on the amount of shooting that has been done.

Kebakat:—For every coconut palm protected, the owner supplies 4 nuts, while for every fruit tree he pays 20 cents. Collection normally takes place twice a year.

The period of protection normally varies with the levy; *i.e.* with a quarterly levy, protection is for a quarter. There is, however, a wide variation at present as regards both the frequency of levying, the nature of the levy, and also as to the relation between frequency of levying and period of protection.

In addition, the villagers sometimes choose their own shooters, without reference to the local headman, and the person chosen may be a local resident or from another district. The principle, however, remains the same throughout—nominated shooters reimbursed by a levy in kind.

These control measures usually succeed very well, although there are occasional disputes as to the selection of shooters, and at times, individuals are met with who refuse to subscribe to their local scheme. In these cases, pressure of opinion can usually be relied upon to rectify matters after a while.

During the past two years, Government, recognizing the value of the system, has sought both to assist and to extend it. This has been done by making available on request supplies of powder, shot and percussion caps to any headman or nominated shooter. In arranging distribution of available ammunition, the extension of the scheme is borne in mind and new areas usually receive prior consideration. The issue of further supplies is made contingent upon the production of tails sufficient to account for the utilization of the previous issue. In 1937 the Department of Agriculture issued 166 lbs. of powder, 1,097 lbs. of shot and 7,753 percussion caps, and received in return 20,144 tails. Much of this ammunition was distributed in new areas and the assistance given resulted in a number of these areas adopting the system which has now a footing in all five Districts. This progress is being continued during the current year.

In Ulu Kelantan District, a large wire trap (*jebak*) has been widely used for control purposes. These traps, which are reputed to be effective, cost about $1 and are made by certain of the Ulu people. It is probable, however, that less interest will be shewn in trapping in the more accessible parts of the District, now that shooting is being organized in this area.

Received for publication 27th. April, 1938.

Abstract.

THE CASHEW NUT INDUSTRY IN WESTERN INDIA*

In Europe cashew nuts are frequently used for decorative and flavouring purposes in the baking and confectionery trades. As "salted nuts," they are even more familiar in the United States of America. In flavour and in nutritive value, cashew nuts compare very favourably with almonds for which they are sometimes substituted in the preparation and decoration of cheaper grades of confectionery.

The cashew nut tree (*Anacardium occidentale*) is now to be found in many parts of the world. Originally a native of South America, it was introduced into Asia and Africa by early Portuguese travellers. At the present time cashew nut trees grow extensively in tropical America, from Mexico to Brazil, and in the adjacent islands of the West Indies. They flourish in the forest countries of East and West Africa and in Madagascar, in Indo-China, the Malay Peninsula, and in the Philippine Islands. Along the coastal tracts of Western and Southern India the cashew nut tree, with its luxuriant dark-coloured foliage, is common in the forested hill regions where the warm and humid atmospheric conditions favour its natural development and spread. Like its near relation, the mango tree (*Mangifera indica*), it thrives well in the vicinity of the sea and is a prominent feature of the scrub jungles of the Konkan, that interesting and fertile strip of country which forms the coastal boundary of the south-western districts of the Bombay Presidency. This tract consists of an elevated plateau, intersected by numerous rivers and creeks. It is subject to heavy rainfall, varying from 90 to 150 in. annually, all of which falls during the four monsoon months of June to September. The climate is equable during the short cold weather season, but, for the greater part of the year, hot and humid conditions prevail.

As a general rule, cashew nut trees grow wild in the Konkan forests and little or no attempts are made by the Indian cultivators to establish them in cultivated plantations.

Under favourable conditions, the cashew nut tree, though somewhat ungainly in habit, grows to a height of 20 to 30 ft. and bears a thick foliage of dark coloured broad leaves. In the Konkan tract it flowers in January or February, and the peculiarly-shaped fruits ripen about two months later. Fruit-bearing commences at the end of the third year. The true fruit or cashew nut attains its full size in a very short time and can be seen hanging from the branches in dark green clusters. After the formation and ripening of the nut, the stalk or peduncle of each nut gradually swells and assumes a fleshy, turgid appearance, somewhat resembling an overripe apple. This cashew "apple" matures to a bright red or yellow colour, a striking contrast to the dark olive-green nut which projects as a kidney-shaped excrescence from the apex of the rounded and pulpy "apple." These cashew

* Abstracted from an article by W. J. Jenkins, M.A., B.SC., I.A.S., Acting Director of Agriculture, Bombay Presidency, published in the Bulletin of the Imperial Institute Vol. XXXVI No. 1, 1938.

"apples" are collected by hand in April or May and the nuts are separated from the swollen stalks in the huts of the villagers. In the Konkan a mature cashew nut tree of eight to ten years old will yield from 100 to 150 pounds of "apples" annually, from which about 20 to 25 lb. of unhusked nuts are obtained. The local value of the produce of a well-grown tree is approximately Rs. 2 to Rs. 2-4, or about 3s. 6d.

After the cashew nuts have been collected they have to undergo several processes before they are ready to be marketed as the "blanched cashew kernels" of commerce. The most important of these after-treatments is roasting, which not only facilities the extraction of the kernel from the hard, outer husk, but which also renders the kernel more palatable and fit for human consumption. In the jungle villages primitive methods of carrying out this process have been in use for many years. The entire nuts are placed in earthenware pots which are perforated on the base to permit the escape of the pungent, astringent oil released from the husks during the roasting treatment. These pots, each containing about 1½ to 2 lb. of nuts, are balanced on three stones over a slow burning fire, fed with dry cowdung fuel and dead leaves. While heating, the nuts are stirred with wooden ladles and the expelled oil, which drains through the holes in the base of the pot, is collected in an iron spoon. After about 10 minutes roasting the nuts are ready for separation. They are placed in a basket and sprinkled with wood ash, so that the oil with which they are covered will not adhere to the hands of the workers. This precaution is very necessary as the oil contained in the husks, and given off during the roasting, is injurious on account of its blistering property, due to the presence of an astringent substance known as "cardole," which has a similar action to crude carbolic acid on the human skin. The husks are then cracked between two stones and the kernels are extracted by hand. No efficient mechanical device for this separation has yet been evolved in spite of the development of the cashew nut industry on a factory basis in several centres of the district. In the adjoining regions of Kanara and Portuguese India, *i.e.* Goa, a method has been adopted whereby the cashew nuts are roasted in hot sand prior to the extraction of the kernels. This process results in a greater percentage of oil being left in the kernels than by the "pot" method. Consequently, kernels roasted by the "sand" method are never so sweet or palatable as those prepared by the original and more primitive village system.

In the Konkan districts of the Bombay Presidency, and in the adjoining Portuguese territory of Goa, several factories have now been established for the large-scale preparation of cashew nuts for export markets. As the local supplies are at present inadequate for factory requirements, large imports of raw, unhusked cashew nuts are made each year from Mozambique, Zanzibar, and the East African ports for processing in the Indian factories.

On arrival at the factory the nuts are roasted in large open pans or in perforated rotary drums suspended over flaming fires fed with the oily and inflammable dry husks as fuel. This roasting process lasts from one to two minutes and about 8,000 lb. of nuts are roasted in each pan daily. When the rotary drum method is

used, the nuts are soaked overnight in water before being fed into the drums next day for roasting. This preliminary soaking softens the hard outer shell and enables the roasting to be done without burning the nuts, which often occurs in the "open pan" system. The drums are 12 ft. long and 3 ft. in diameter and are usually made of galvanized iron sheeting. They are geared to a turning mechanism worked by hand and are fixed in a sloping position above the furnace. During roasting the nuts are fed in continuously at the upper end of the cylinder, which is revolved rapidly or slowly according to the intensity of the fire. As the drum revolves the nuts gradually roll through the interior, getting adequately roasted on the way, and are finally discharged from the open lower end. The pungent oil which is given off by the husks during roasting drains into a separate collecting receptacle. The roasting room is full of the oily smoke and acrid smell of the burning husks which have a most unpleasant effect on the nose and eyes of the unseasoned visitor.

After roasting, the nuts are dusted with wood ash and removed in flat, shallow baskets to a large shed where the husks are broken open and the kernels extracted. This work is done entirely by women and girls, who squat on the floor and crack the roasted nuts with small wooden batons on flat stones embedded in the ground in front of them. Considerable skill is required to carry out this operation quickly without damaging the kernels and thereby reducing to a very great extent their commercial value. Twenty-five lb. of unhusked nuts yield from 6 to 8 lb. of kernels. The kernels, when extracted, are covered with a thick yellow skin which must be removed before packing for export. To facilitate the removal of this outer integument, the kernels are subjected to baking in drying chambers at a temperature of 70°C. for four to six hours. As a result of this treatment the yellow outer skin dries up and shrivels and can be easily and completely removed by hand, leaving the ivory-white and shining surface appearance desired by the trade. During this drying process the kernels become brittle and would easily be damaged and broken in packing and transport. Accordingly they are now subjected to a "sweating" treatment which is carried out with the object of enabling the dried kernels to absorb moisture and thus prevent excessive breakage and chipping in subsequent handling. For this purpose the kernels are spread out in a single layer on long flat trays, which are placed in "sweating chambers" over small tanks of water. The necessary moisture is absorbed by the kernels after about two or three hours of this treatment, when they are removed to another part of the factory for grading and packing for export. The kernels are graded by skilled female labour, according to size, and are then packed in tins, each containing 25 lb. of kernels. The air contained in the packed tins is exhausted by means of a vacuum pump and replaced by carbon dioxide to prevent the subsequent development of moulds on the produce.* The tins are then hermetically sealed, labelled, and packed in wooden crates for export.

* We understand that in East Africa the air is exhausted by means of an ordinary tyre pump arranged for this purpose, and that there is no replacement of the air by carbon dioxide. This process is stated to be sufficient to keep the nuts in good condition—*Ed. M.A.J.*

The great bulk of the production of Indian "blanched cashew kernels" is exported to the United States of America. About 15,000 tons of raw, unhusked nuts are imported into India annually for preparation in the Indian factories and are re-exported along with the locally-grown produce. Such imports are mainly from Portuguese East Africa, Kenya Colony, and the Union of South Africa. In 1934-35 the export of "blanched cashew kernels" from India to America was approximately 5,300 tons, which increased in 1935-36 to 7,700 tons. Exports to the United Kingdom and to the Continent in these two years did not exceed 270 and 750 tons respectively, and, accordingly, it is obvious that the industry depends at present almost entirely on the demand of the America consumer. The annual export of cashew nuts from India represents a cash value of over 50 lakhs of rupees, *i.e.* £385,000, and the industry gives employment to 10,000 to 15,000 people during the season.

The cashew "apple" in India has been used for the illicit distillation of an intoxicating liquor. Experiments to prepare a vinegar from the "apple" have not given much promise of economic utilization in this direction.

The cashew oil, which is extracted from the shells of the raw nuts during the process of roasting, has many valuable uses. At one time it was employed only by the natives, but much work has been done in recent years with a view to its industrial utilization. Processes have been devised for using it in the preparation of different kinds of varnishes, insulating coatings, moulding compositions, inks, etc. During 1936 large quantities of the oil were exported, principally to the United States and Germany, and one company with factories near Quilon is planning to produce 200,000 gallons of shell oil annually. In view of the growing demand for the oil new methods for its extraction are being developed so as to prevent the large wastage incurred in the ordinary treatment of the nuts.

In India, where the shell oil is sold locally at the rate of Rs. 1-8-0 per maund of 28 lb., it is in demand as a lubricant for country boats and has the valuable property of preventing damage by white ants when painted on furniture, books, and similar perishable articles. The oil is also used by fishermen as a preservative for their nets. The villagers maintain that cashew shell oil is a valuable specific against leprosy, that dreaded scourge of the East, and there is evidence from medical men in the districts that the oil is efficacious in the treatment of this disease.

The resinous gum exuded from the bark of the tree has well-known insecticidal properties and is also used as a tanning agent. The sap obtained from incisions in the bark is utilized as an indelible marking ink. Finally, the wood of the tree is a common fuel in the regions where it is obtainable, and it is also utilized for the manufacture of country boats, packing cases, and in the preparation of charcoal.

Miscellaneous.

MALAYA AND TEA RESTRICTION.

In reply to a question at the meeting of the Federal Council of the Federated Malay States held on 30th. June, 1938, the Adviser on Agriculture (the Hon'ble Mr. O. T. Faulkner, C.M.G.) reviewed the history of Malayan participation in tea control and the position regarding negotiations with the International Tea Committee. He stated:—

"Under the first Tea Restriction Agreement, which terminated on 31st. March this year, Malaya was allowed to plant up to a total of 6,000 acres. As soon as the necessary legislation was passed permits were issued, at the beginning of 1937, to everyone who wished to plant and was able to do so, but owing to the short time available the amount actually planted from January 1st. 1937, to March 31st. 1938, was only 1,272 acres, making the total planted area 4,716 acres on the latter date.

"In the big tea growing countries the preliminary negotiations with the Internatonal Tea Control Committee—itself an unofficial body—were conducted by representatives of the Tea Planters' Associations of those countries, so that in due course agreed proposals were submitted to the Governments concerned for consideration. But in Malaya at that time there was in no sense any body of tea planters who could thus negotiate with the International Committee. Your Excellency had, therefore, to conduct all the negotiations through the Malayan Information Agency on behalf of all the Malayan Governments; though those persons who had already planted tea in Malaya were consulted as fully as was possible in the circumstances.

"When the new Agreement, to start on April 1st. this year, came to be considered the same course was followed and Your Excellency made to the International Tea Committee a demand that we should be allowed, in Malaya, to plant up to a total of at least 10,000 acres in all by the end of the agreement, i.e. by 31st. March, 1943. This was a minimum figure and it was indicated that more might be demanded in certain circumstances. In support of this demand, Your Excellency put forward, through your representative, a case which I personally considered to be both extremely strong and at the same time entirely reasonable. But the International Tea Committee, after first proposing that we should be allowed no increase at all beyond the 6,000 acres already mentioned, eventually made an offer of only 7,000 as the total to be allowed to be planted by the end of the Agreement, *i.e.* by the 31st. March, 1943. At the same time the United Planting Association of Malaya approached the Federal Secretary, stating that it considered that our minimum demand should be for 15,000 acres over and above whatever the area actually planted might be on March 31st. 1938, *i.e.* roughly a total of 20,000 acres by March, 1943.

"In these circumstances, Your Excellency decided that the best course was to ask the United Planting Association of Malaya to form a Tea Planters' Section or Committee and to request that Committee to conduct the further negotiations with the International Tea Committee, appointing its own representative in

London for the purpose. Your Excellency suggested that I should be invited to attend all meetings of the local Committee to act as liaison officer. The United Planting Association of Malaya agreed to this course and duly formed a Committee, of which I attended the only meeting that has as yet been held. The Committee decided to ask Mr. J. G. Hay, a director of Messrs. Guthrie & Co. Ltd., who attended the meeting, to act as their representative in this matter; and in subsequent correspondence the Government assured the United Planting Association that it would support Mr. Hay's representations on behalf of Malaya; although naturally the Governments of Malaya, like those of all the other tea-growing Colonies, reserve the right to accept or reject the results of the negotiations between the unofficial representatives of the industry in Malaya and the International Tea Committee. Mr. Hay unfortunately fell sick at Singapore on his way home so that his departure to England was delayed by some weeks.

"In the meantime, in order that planting should not be held up, and also in view of the desirability of clearing being carried out at an early date in order to provide employment, I informed everyone who had already planted tea on anything more than an entirely petty scale and also anyone believed to be likely to do so, that I would consider applications for permits to plant during 1938 and that I would issue permits for planting which would automatically expire on the 31st. of December, 1938. Under this temporary arrangement applications have been received for permits to plant 1,674 acres and permits for the planting of this area have been issued, so that the total area which is now planted or permitted to be planted before 31st. December, 1938 is 6,380 acres."

Departmental.

OBITUARY.

JOHN HORACE DENNETT, B.SC.

It is with profound regret that we record the death of Mr. John Horace Dennett which took place at Kuala Lumpur on 14th. June, 1938.

Mr. Dennett was born in 1899 and educated at King Edward VI School Birmingham, and later at Birmingham University where he obtained the degree of Bachelor of Science.

In 1921 he was appointed Assistant Agricultural Chemist, Department of Agriculture, S.S. and F.M.S., and in 1935 was promoted to Soils Chemist, a post which he held at the time of his death.

Mr. Dennett's early research work was mainly concerned with the commercial aspects of nipah palm cultivation, but in the scientific sphere he will be best remembered for his valuable work on Malayan soils.

Those who were closely connected with his work recognised his abilities. Unhurriedly he persued the course of his investigations and would not commit himself before he had satisfied his own high standard of reliability. He possessed the right temperament for research work, and his untimely death robs us of an investigator whose future career was full of promise.

During the Great War he served with the Royal Naval Air Service and the Royal Navy; and also saw active service with the Tank Corps. In Malaya he closely associated himself with the volunteer movement and commanded the F.M.S.V.F. Light Battery with the rank of major.

Mr. Dennett's personality commanded the affection and respect of all those who were privileged to be amongst his intimates. Of these his colleagues in the Department of Agriculture counted themselves and his passing away has cast a gloom which will not pass lightly. He will be long remembered by us, and by his friends outside the Department; and our sympathy is extended to his wife and daughter in their bereavement.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports of Agricultural Officers.

June, 1938.

The Weather.

The weather throughout the country was abnormally hot and dry during the month. At only a few isolated centres did the rainfall approach normal.

In Kedah and northern Perak storms occurred towards the end of the month which to a certain extent mitigated the dry conditions. In Selangor, however, the drought persisted and it was reported from some of the coastal villages that there was a shortage of drinking water.

In Negri Sembilan some heavy rain was experienced in the coastal districts, but the total precipitation was below average.

Remarks on Crops.

Rubber.—The price of rubber appreciated steadily towards the end of the month, the highest and lowest prices for smoked sheet being $27.50 and $21. The value of coupons rose also to a maximum of about $19 per picul equivalent.

Despite the increase in price the number of holdings out of tapping increased in many districts, owing to the fact that the owners were engaged in harvesting the fruit crop or working in the padi fields. Johore similarly reports a decrease in the holdings in tapping and the small-holders' lack of interest in the preparation of good quality smoked sheet is very evident. In the Northern Circle not one of the new smoke cabinets was in operation during the month.

The Rubber Dealers' Union of the Temerloh District in Pahang has issued, with the approval of the State Agricultural Officer, to all small-holders about 10,000 copies of an instructional circular on the preparation of good quality sheet rubber. These pamphlets are being distributed from the dealers' shops and are also posted at conspicuous places throughout the District.

Padi.—The dry weather has interferred to a certain extent with padi planting, particularly where adequate irrigation facilities do not exist.

The price being paid for padi at the Government Rice Mill in Krian remains at $2.10 per picul. The total quantity of padi purchased by the Mill this season has reached 153,000 piculs. The inspection and sealing of sacks of S.48 for the 10 cent bonus paid by the Mill has now been completed and a total of 97,000 sacks were sealed during the season, an increase of 9,000 over last year.

At the Temerloh rice mill a total of 3,608 piculs of padi have so far been handled which is a record for the mill. Buying is now decreasing but it is expected that a further quantity of several thousand gantangs which is at present being held in the various mukims, will come to the mill when the planting of new season's crop has been finished.

Many small privately-owned rice mills have lately started work in Kedah. This has undoubtedly done much to increase the prices paid for padi, which in previous seasons have tended to be low.

The harvest is now everywhere completed.

In Johore the Drainage and Irrigation Department has commenced work on the irrigation of rice fields in the Tenglu area. A scheme has also been drawn up for the irrigation of two comparatively large areas in the vicinity of the Sungei Tenglu.

Coconuts.—The price of copra remained low and it appears that in some places there is a reversion to the old practice of sale of nuts to Chinese dealers, rather than to prepare copra on the holding.

Fruit.—Rambutan, mangosteen and durian are now in season and bumper crops are being harvested in many districts. Prices, however, have been very low—due probably to the decreased purchasing power of the community.

It is reported that in Province Wellesley and Penang mangosteens are only being harvested from easily accessible trees. On the hill and in out-of-the-way orchards the fruit is being left to rot, as the price is too low (30 cents per 1,000) to pay for harvest and transport.

Livestock.—The live weight price of pigs fell to unusually low levels, $11 per picul being the lowest price quoted in Penang. The price in Selangor was $14 to $16.50. The market price of pork has not shown a decrease.

Pineapples.—The price of fresh fruit remains at the low levels previously quoted, 60 to 70 cents per 100 for 1st quality being the price paid at factories in South Johore. There is little or no sale for the lower grades and considerable wastage on this account continues to be reported. As a result of the uneconomic position, upkeep on holdings is badly neglected. The price realized for the canned product has not improved.

Penghulus' Courses.—Penghulus' courses were held in the Central, North and Southern Districts of Malacca and were attended by a total of 119 Penghulus and Sidangs. The courses were very comprehensive and included instruction on the preparation of sheet rubber, budding and care of fruit trees, planting of Guinea grass for buffalo fodder, compost making and poultry keeping.

DEPARTMENTAL NOTES.

Appointments.

Mr. B. G. A. Lowe, Botanist, Department of Agriculture, S.S., and F.M.S., has been appointed to be an Agricultural Officer, Department of Agriculture, S.S. and F.M.S. with effect from 1st March, 1938, inclusive.

Mr. R. G. H. Wilshaw, Chemist (Soils) has been appointed to act as Senior Chemist (Soils) consequent upon the death of Mr. J. H. Dennett.

Leave.

Mr. H. L. Barnett, Assistant to Agricultural Economist, has been granted 250 days' leave with effect from 4th June, 1938, inclusive.

Mr. A. de K. Frampton, Agricultural Officer, has been granted 217 days' leave with effect from 17th June, 1938, inclusive.

Mr. F. Birkinshaw, Chief Field Officer, has been granted 237 days' leave with effect from 2nd. July, 1938, inclusive. During his absence on leave, Mr. A. E. Coleman-Doscas, State Agricultural Officer, Johore, will act as Chief Field Officer with headquarters at Kuala Lumpur.

Mr. C. W. S. Hartley, Agricultural Officer, returned from leave on 3rd. June, and proceeded to Malacca to take over the duties of Agricultural Officer, Malacca.

TRADE ENQUIRIES FOR DERRIS.

A firm in New York desires to be placed in touch with estates in Malaya who expect to be harvesting Derris Changi No. 3 in the near future. The firm in question, however, is not in a position to contract in advance for the entire output of an estate, as they are compelled by trade considerations to purchase at the current market price.

(Ref. 32 A in D.A. 515/37).

A firm in the United Kingdom states that although they have contracted ahead for fair quantities of derris root, they have not fully covered their requirements and are quite prepared to consider offers of suitable derris root. The firm is not interested in small quantities such as 1 or 2 tons of root, but wish to be placed in touch with supplies of quantities of the order of 20 tons or more.

(Ref. 34 in D.A. 515/37).

FERTILIZER PRICES, JUNE, 1938.

The following are the prices at the end of June, 1938, of some of the more important fertilizers.

Product.	Analysis				Price per ton $
	Nitrogen (N)	Phosphoric Acid (P_2O_5)		Potash (K_2O)	
		Soluble	Insoluble		
Sulphate of Ammonia ...	20.6	—	—	—	72.75
Calcium Cyanamide ...	20.6	—	—	—	80.00
Muriate of Potash ...	—	—	—	50	112.00
Sulphate of Potash ...	—	—	—	48	112.00
Superphosphate (concentrated) ...	—	39 - 40	—	—	105.00
Superphosphate ...	—	16 - 18	—	—	60.00
Basic Slag ...	—	16	—	—	50.00
Rock Phosphate (Christmas Island) ...	—	11*	38‡	—	33.50
Rock Phosphate (very finely ground Gafsa) ...	—	11*	26 - 28‡	—	40.00
Lime ...	—	—	—	—	20.00

* Citric soluble. ‡ Total.

Quotations are *ex* warehouse, Port Swettenham, Klang, Singapore and Penang, with the exception of muriate of potash which is *ex* warehouse, Port Swettenham, Klang and Singapore.

The above quotations for concentrated superphosphate, superphosphate and Christmas Island phosphate are *ex* warehouse Penang, Port Swettenham and Klang. The Singapore quotations for these three fertilizers are $95, $50 and $31.50 per ton respectively.

Statistical.

MARKET PRICES.

June, 1938.

Major Crops.

Rubber.—Prices shewed a steady improvement during the month. Spot loose opened at 19¼ cents per lb., dropped two days later to 18½ cents, the lowest price reached during the month, and then gradually improved, to close the month at 23⅝ cents per lb., the highest price being 23¾ cents on 29th.

The average price for the month of No. 1. X. Rubber Smoked Sheet was 20.27 cents per lb., as compared with 18.96 cents in May. The London average price was 6.06 pence per lb., and the New York price 12.36 cents gold, as compared with 5.63 pence and 11.49 cents gold in the previous month.

Prices paid for small-holders' rubber at three centres during June are shewn in Table I.

Table I.

Weekly Prices Paid by Local Dealers for Small-Holders' Rubber, May, 1938.

(Dollars per Picul.)

Grades	Kuala Pilah, Negri Sembilan				Kuala Kangsar, Perak				Batu Pahat, Johore.				
	2	9	16	30	8	15	22	29	1	8	15	22	29
Smoked sheet ...	22.00	22.60	23.38	28.00	22.00	21.94	24.00	24.79		21.10			26.00
Unsmoked sheet ...			21.50		19.64	17.00		24.00	19.50	19.30	20.30	22.80	25.00
Scrap ...	No purchases												

Transport by F.M.S.R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.
Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.
Transport from Kuala Kangsar to Prai by railway $6.20 per ton.
Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).
At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.
At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.
No purchase at Kuala Kangsar on 1st June, or at Kuala Pilah on 23rd June.

Palm Oil.—The price of palm oil dropped £1 early in June over the last quoted price in May, but recovered this price at the end of the month. Palm kernels weakened over May prices. Quotations during June are given in Table II.

Table II.

Prices of Palm Oil and Palm Kernels.

Date 1938.	Palm Oil in Bulk, c.i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
June 3	£ 13. 0. 0	£ 8. 12. 6
,, 10	13. 0. 0	8. 12. 6
,, 17	13. 10. 0	8. 15. 0
,, 24	14. 2. 6	8. 12. 6

Copra.—Copra, which weakened towards the end of May shewed a slight improvement during the first part of the month of June. In the middle of the month it was inclined to sag, but recovered during the last week.

The average price of the sun-dried grade was $3.37 per picul, as compared with $3.71 in May. The Mixed grade averaged $3.04 per picul as compared with $3.31 in May.

Copra cake was quoted throughout the month at $2.10 per picul, as compared with an average of $1.88 per picul in May.

Rice.—The average wholesale market prices of rice per picul in May were as follows:—Siam No. 2 (ordinary) $4.16, Rangoon No. 1 $3.90, Saigon No. 1 $3.92; as compared with $3.98, $3.62 and $3.85 in April and $4.21, $3.62 and $3.60 in May 1937.

The average retail prices in cents per gantang of No. 2 Siam rice remained unchanged: Singapore 28, Penang, 32, Malacca 28.

The average declared value of imports during May was $3.92 per picul, as compared with $3.91 in April and $3.89 in March.

Padi.—The Government Rice Mills, Perak, continued to pay $2.10 per picul for padi. The price in the larger padi-growing districts was generally around $8.00 to $8.50 per 100 gantangs. In most of the smaller padi-growing districts the average price was around $9 per 100 gantangs, while in non-padi growing districts and in towns the price range was from $10 to $14.50 per 100 gantangs.

Pineapples.—A further decline in prices over last month of about 15 cents per case for all grades of canned pineapples is recorded at the end of June. The following are the average prices per case of 48 tins of 1½ lbs. each:—G.A.Q.: Cubes $2.60, Sliced flat $2.55, Sliced Tall $2.70; Golden Quality: $2.75, $2.70, and $2.85 respectively.

Fresh pineapples at Singapore factories were from $1.30 to 50 cents per 100 fruits, the price within the range depending on quality. In South Johore the prices were 1st quality $1.20 to 66 cents, 2nd quality 60 to 40 cents, 3rd quality 30 to 55 cents. North Johore prices tended to be rather higher. In Selangor pines from small holdings were from 25 to 50 cents per 100, from estates 40 to 60 cents per 100.

Beverages.

Tea.—Eleven consignments of Malayan tea comprising a total of 950 packages were sold on the London Market during June. Four consignments (330 packages) were upland tea and seven consignments (620 packages) were lowland tea. The upland tea sold at prices between 1s. 2¾d. to 1s. 1¼d. per lb., the average price being 1s. 1.94d., while the prices obtained for the lowland tea varied from 1s. 1d. to 11¾d., the average price being 1s. 0.25d. per lb.

Average London prices per lb. during June for consignments of tea from other countries were as follows:— Ceylon 1s. 2.34d., Java 1s. 0.56d., Indian Northern 1s. 1.81d., Indian Southern 1s. 1.72d., Sumatra 11.06d.

The latest Colombo average prices available, quoted from *The Ceylon Tea Market Report,* 28th June, 1938, of the Colombo Brokers' Association, are as follows, in rupee cents per lb.: High Grown Teas 77 cents, Medium Grown Teas 67 cents, Low Grown Teas 60 cents.

Coffee.—Palembang coffee prices varied but little averaging $11.85 to $13.10 per picul depending on quality, while Sourabaya coffee was steady at prices averaging $6.70 to $8.65. The May averages were $11.12 to $13.12 and $9.19 to $10.19 per picul.

Prices in Singapore of other varieties of coffee were as follows (per picul):— Liberian $14 rising to $14.50; Excelsa $9 rising to $9.50; Robusta $6.50 dropping to $6.00.

Spices.

Arecanuts.—The improvement in prices recorded in the previous month were generally well maintained in June. The range of Singapore prices—depending on quality—during the month were as follows:—Splits $4.26 to $7.29; Red Whole $4.50 to $6.25; Sliced $4.30 to $9.10 per picul.

The average of the Singapore Chamber of Commerce quotations per picul were lower than those recorded in May; they were:—Best $6.96, Medium $6.44, Mixed $5.87.

Pepper.—Prices declined in June for all grades of pepper. Average prices per picul in Singapore were as follows:—Black $8.06, White $13.44, Muntok $13.69 as compared with $8.25, $13.69 and $13.94 respectively in May.

Nutmegs.—Both 110's and 80's were quoted throughout the month at $30 per picul.

Mace.—Siouw mace stood at $90 per picul for the first half of the month and then dropped to $82, while Amboina similarly dropped from $74 to $68. Average Singapore prices per picul in June were $86 and $71 respectively, as compared with $90 and $74 in May.

Cloves.—Little interest was shewn in this product and nominal prices for both Zanzibar and Amboina cloves were quoted at $40 per picul.

Cardamoms.—Latest available price of green cardamoms as given in the Ceylon Chamber of Commerce Weekly Report of 27th June is from Rs.1.20 to Rs. 1.32 per lb.

Miscellaneous.

Derris.—Fair supplies are still available owing to lack of orders from abroad, and prices have further declined. Average prices in June for root sold on a basis of ether extract $14 per picul; root sold on rotenone content $22 per picul.

Gambier.—Gambier prices in Singapore remained steady at Block $7.50 and No. 1 Cube $15.50 per picul.

Tapioca.—The price of Flake Fair dropped to $4.10 per picul in mid May and was quoted at this price throughout June. Seed Pearl which dropped to $4.00 per picul in mid May, fell another 10 cents a month later; the average price of this grade in June was $3.95, as compared with $4.12 in May. Medium Pearl was quoted throughout June at $4.75, a price it has held since the middle of May.

Sago.—Singapore prices of sago shew an improvement in June over those of the latter half of May; average prices were Pearl, Small, Fair $3.56, Flour, Sarawak, Fair $1.79 per picul as compared with $3.61 and $1.95 in May.

Tobacco.—In Perak, where there is a flourishing trade in the manufacture of cheroots, uncured leaf was sold from $6 to $4.50 per picul, while the general range of dried leaf was (per picul):— 1st quality $40 to $34, 2nd quality $36 to $27, 3rd quality $26 to $15. Kedah prices of three grades were I $40.50 to $45, II $26 to $30, III $18 to $20. Prepared tobacco in Kedah was quoted at I $130, II $105, III $85. Negri Sembilan prices varied from $55 to $15 according to grade. In Johore prices varied considerably in different districts, Javanese types being from $50 to $70 and Chinese types $32 to $36. Dried leaf in north Johore was from $20 to $50 and prepared $75 to $95.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports and certain coffee prices are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for imported coffee and arecanuts by the Lianqui Trading Company of Singapore, and derris prices by Messrs. Kohyei & Co., and Messrs. Hooglandt & Co., Singapore.

1 picul = 133 1/3 lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Trafalgar Square, London, W.C. 2.

GENERAL RICE SUMMARY*

May, 1938.

Malaya.—Imports of foreign rice during May amounted to 64,596 tons†, and exports to 18,171 tons, net exports being 46,425 tons as compared with 45,169 tons in 1937.¶

Of the imports during May, 44 per cent. were consigned to Singapore, 21 per cent. to Penang, 7 per cent. to Malacca, 22 per cent. to the Federated Malay States, and 6 per cent. to the Unfederated Malay States. The foreign imports by countries of origin were as follows (in tons, percentages in brackets):— Siam 38,551 (59.7), Burma 22,843 (35.4), French Indo-China 2,130 (3.3), other countries 1,072 (1.6).

Of the exports during May, 84 per cent. were consigned to the Netherlands Indies and 16 per cent. to other countries. The various kinds of rice exported were as follows (in tons, percentages in brackets):—Siam 11,874 (65.4), Burma 5,706 (31.4), French Indo-China 507 (2.8), parboiled 42 (0.2), local production 42 (0.2).

India and Burma.—Exports from India during the first four months of the year amounted to 98,000 tons, as compared with 553,000 tons in 1937 a decrease of 82.3 per cent. Of these exports, 4.1 (4.5) per cent. were to the United Kingdom, 8.1 (6.9) to the Continent of Europe, 33.7 (26.0) to Ceylon, 5.1 (24.8) to the Straits Settlements and the Far East, and 49.0 (37.8) to other countries. The percentages in brackets are for the corresponding period in 1937.

Burma's exports from 1st. January to 25th. May totalled 1,689,252 tons, an increase of 5.0 per cent. when compared with the previous year's figures of 1,609,086 tons. Of these exports 41.7 (47.6) per cent. were to India, 9.3 (8.1) to the United Kingdom, 7.7 (6.1) to the Continent of Europe, 10.4 (10.5) to Ceylon, 14.0 (12.3) to the Straits Settlements and the Far East and 16.9 (15.4) to other countries. percentages in brackets are for the corresponding period in 1937.

Siam.—Exports of rice and rice products from Bangkok during March were 145,665 tons, as compared with 89,847 tons in 1937. Total exports for the first quarter 1938 totalled 413,070 tons as compared with 301,294 tons in 1937.

Japan—According to the *Trans-Pacific Journal* of 19th. May, 1938, stocks of rice in Japan on 1st. May amounted to 5,189,280 tons, representing a decrease of 56,604 tons, or 1 per cent. as compared with the same period of last year.

On the basis of 1st. May rice stocks, the supply and demand relations of rice during the 6 months ending 31st. October 1938, the between-seasons, are estimated as follows (in '000 tons):—

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* Abridged from the Rice Summary for May 1938 compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† Ton = long ton (2,240 lbs.)

¶ It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1937.

Supply		Demand	
May 1 Stocks	5,189	Estimated consumption	4,909
Estimated imports from abroad	32	,, exports abroad	5
Estimated imports from Korea	603	,, ,, to colonies	36
Estimated imports from Formosa	393		
Total	6,217	Total	4,950

Stocks at between-seasons 1,267.

French Indo-China.—Entries of padi into Cholon during the first five months of 1938 totalled 615,712 tons, as compared with 723,097 tons in 1937, a decrease of 14.9 per cent. Exports of rice during the same period were 581,970 tons as compared with 646,346 tons in 1937, a decrease of 10.0 per cent.

The Netherlands Indies.—According to the *Netherlands Indies Economic Bulletin* Vol. VI No. 1 January 1938, issued by the Department of Economic Affairs, the production of the 1937 rice crop of Java and Madoera remained practically equal to that of the record rice year 1936. Figures for the year 1937 and for preceding years are as follows (in '000 tons):—1937 (provisional) 3,778, 1936 3,777, 1935 3,630, 1934 3,340, 1933 3,558, 1932 3,510.

The area harvested under rice in Java and Madoera during 1937 amounted to 9,546,550 acres, as compared with 9,566,310 acres for the preceding year, a decrease of 0.2 per cent.

Imports in 1937 were 8,426 tons to Java and Madoera and 165,212 tons to the Outer Provinces, as compared with 8,466 and 220,633 respectively in 1936. Exports from Java and Madoera in 1937 were 16,832 tons to other countries and 193,992 tons (mainly foreign rice) to the Outer Provinces. Corresponding figures for 1936 were 11,726 and 100,359 tons.

Ceylon.—Imports during the first five months of 1938 totalled 237,229 tons as compared with 228,847 tons in 1937, an increase of 3.7 per cent. Of these imports 16.3 (15.8) were from British India, 72.1 (70.3) from Burma, 0.4 (0.1) from the Straits Setltements, and 11.2 (13.8) from other countries. Percentages in brackets are for 1937.

Europe and America.—Shipments from the East to Europe from 1st. January to 13th. May totalled 458,625 tons, as compared with 514,932 tons in 1937, a decrease of 10.9 per cent. Of these shipments, 61.3 (49.4) per cent. were from Burma, 24.9 (40.6) per cent. from Saigon, 11.1 (6.9) from Siam, and 2.7 (3.1) from Bengal. The 1937 percentages are in brackets.

Shipments for the Levant from 1st. January to 13th. May were 15,762 tons as compared with 6,470 tons in 1937, an increase of 143.6 per cent. Shipments for Cuba, West Indies and America from 1st. January to 11th. May were 81,703 tons, as compared with 102,239 tons in 1937, a decrease of 20.1 per cent.

MALAYAN AGRICULTURAL EXPORTS, MAY, 1938.

PRODUCT.	Net Exports in Tons				
	Year 1937	Jan./May 1937	Jan./May 1938	May 1937	May 1938
Arecanuts ...	30,084	13,334	17,743	1,567	3,766
Coconuts fresh † ...	95,223†	32,979†	36,414†	6,149†	6,231†
Coconut oil ...	39,762	14,553	17,585	2,882	3,069
Copra ...	75,592	22,310	14,987	4,791	2,545
Gambier, all kinds ...	1,955	850	612	173	103
Copra cake ...	15,026§	5,810	2,386	1,419	298
Palm kernels ...	7,312	2,530	3,592	515	807
Palm oil ...	42,787	16,289	20,599	3,134	4,084
Pineapples canned ...	80,502	36,432	33,689	8,780	6,781
Rubber ¶ ...	503,127¶	181,608¶	165,449¶	35,412¶	29,481¶
Sago,—flour ...	15,478	8,441	2,219	177	87
,, —pearl ...	3,759	1,339	1,699	221	324
,, —raw ...	8,256*	3,098*	2,767	538*	435*
Tapioca,—flake ...	1,058	495	126	84	446*
,, —flour ...	2,393*	882*	1,368	71	106*
,, —pearl ...	18,786	7,094	6,708	1,712	1,476
Tuba root ...	573	262	165	48	34

† hundreds in number. * net imports. ¶ production. § gross exports.

MALAYAN PRODUCTION OF PALM OIL AND KERNELS

(In long tons, as declared by Estates)

Month 1938	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S.
January	2,241.7	1,309.2	383.7	232.0
February	2,040.4	1,457.1	370.4	261.0
March ...	2,359.6	1,843.1	446.8	344.0
April	1,963.7	1,122.6	353.6	218.0
May ...	1,491.7	1,480.7	274.8	258.0
Total ...	10,097.1	7,212.7	1,829.3	1,313.0
Total January to May, 1937 ...	8,703.5	6,712.6	1,608.5	1,133.2
Total for the year 1937 ...	27,733.5	17,932.8	5,094.7	2,811.4

Stocks on estates as at 31st May, 1938 were: palm oil 1,914 tons, palm kernels 454 tons.

MALAYAN RUBBER STATISTICS

Acreages of Tappable Rubber actually Tapped and not Tapped on Estates of 100 Acres and over, for the Month ending 31st May, 1938.

State or Territory	Estimated Acreages of Tappable Rubber	Actual area tapped during the month Acreage	Percentage of (3) to (2)	Acreages of tappable rubber not tapped: Estates which have entirely ceased tapping — Acreage	Percentage of (5) to (2)	On estates which have partly ceased tapping: Otherwise than under rotational systems — Acreage	Percentage of (7) to (2)	Under rotational systems — Acreage	Percentage of (9) to (2)	Area of Tappable Rubber never been tapped — Acreage	Percentage of (11) to (2)	Total area not tapped (5) + (7) + (9)	Percentage of (13) to (2)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
S. S.—													
Province Wellesley ...	43,385	23,011	53.1	662	1.5	11,368	26.2	8,344	19.2	403	0.9	20,374	46.9
Malacca ...	122,036	68,139	55.8	2,344	1.9	21,902	18.0	29,651	24.3	2,110	1.7	53,897	44.2
Penang ...	2,488	1,300	52.2	258	10.4	870	35.0	60	2.4	36	1.4	1,188	47.8
Singapore ...	32,391	17,443	53.8	3,551	11.0	6,692	20.7	4,705	14.5	103	0.3	14,948	46.2
Total S.S. ...	200,300	109,893	54.9	6,815	3.4	40,832	20.4	42,760	21.3	2,652	1.3	90,407	45.1
F. M. S.—													
Perak ...	287,042	175,502	61.1	4,798	1.7	52,422	18.3	54,320	18.9	7,070	2.5	111,540	38.9
Selangor ...	325,640	215,970	66.3	6,262	1.9	39,990	12.3	63,409	19.5	6,379	2.0	109,661	33.7
Negri Sembilan ...	254,367	158,523	62.3	6,800	2.7	38,106	15.0	50,938	20.0	7,670	3.0	95,844	37.7
Pahang ...	86,514	54,757	63.3	2,530	2.9	17,836	20.6	11,391	13.2	6,526	7.5	31,757	36.7
Total F.M.S. ...	953,563	604,761	63.4	20,390	2.1	148,354	15.6	180,058	18.9	27,636	2.9	348,802	36.6
U. M. S.—													
Johore ...	475,753	315,001	66.2	7,078	1.5	82,545	17.3	71,131	15.0	33,602	7.1	160,752	33.8
Kedah ...	197,237	128,938	65.4	5,520	2.8	24,169	12.2	39,170	19.9	6,057	3.1	68,799	34.9
Kelantan ...	31,220	21,886	70.1	263	0.8	3,981	12.8	3,988	12.8	2,147	6.9	9,332	29.9
Trengganu (b) ...	4,817	3,214	66.7	nil	nil	24	1.5	1,529	31.8	74	1.5	1,603	33.3
Perlis (c) ...	1,371	858	62.6	216	15.8	257	18.7	40	2.9	84	6.1	513	37.4
Brunei ...	5,426	2,989	55.1	nil	nil	1,620	29.8	817	15.1	557	10.3	2,437	44.9
Total U.M.S. ...	715,824	472,388	66.0	13,077	1.8	113,684	15.9	116,675	16.3	42,521	5.9	243,436	34.0
Total Malaya ...	1,869,687	1,187,042	63.5	40,282	2.1	302,870	16.2	339,493	18.2	72,809	3.9	682,645	36.5

Notes:—(*a*) The acreage shown in column (11) is included in columns (5) and (7).
(*b*) Registered companies only.
(*c*) Rendered quarterly.

MALAYA RUBBER STATISTICS Table I.

ACREAGE, STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF MAY, 1938 IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			Consumption 3	
								during the month		January to May 1938		during the month		January to May 1938						
	Ports	Dealers	Estates of 100 acres and over	during the month	Jan to May 1938	during the month	Jan to May 1938	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to May 1938
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MALAY STATES :—																				
Federated Malay States ...	...	9,034	14,092	10,973	57,081	3,078	20,783	Nil	Nil	Nil	Nil	10,460	3,026	65,225	17,937	...	8,912	14,762	17	75
Johore ...	...	3,615	5,858	5,213	26,835	2,452	14,854	Nil	10	Nil	105	2,941	4,360	16,366	25,215	...	3,683	6,164	...	...
Kedah ...	...	345	3,632	2,757	14,565	787	4,422	Nil	Nil	Nil	Nil	1,603	1,658	9,646	9,210	...	323	3,937	...	...
Perlis ...	...	23	23	14	71	26	114	Nil	Nil	Nil	Nil	Nil	35	Nil	159	...	19	32	...	...
Kelantan ...	...	672	335	383	1,798	575	2,874	Nil	Nil	Nil	Nil	332	642	1,366	3,401	...	606	385	...	...
Trengganu ...	...	55	50	295	1,409	148	705	Nil	Nil	Nil	Nil	Nil	443	Nil	2,114	...	55	50	...	...
Brunei ...	...	6	55	45	226	59	318	...	...	...	...	...	91	...	545	...	15	59	...	...
Total Malay States	...	13,750	24,045	19,680	102,885	7,125	49,070	Nil	10	Nil	105	15,336	10,255	92,603	58,581	...	13,613	29,389	17	75
S. SETTLEMENTS :—																				
Malacca ...	...	2,498	1,434	1,114	5,894	543	2,636	Nil		Nil		2,073		12,453		...	2,326	1,513	...	...
Province Wellesley ...	..	2,287	657	459	2,186	280	1,112	Nil		Nil		6,998		39,328		...	1,578	704	...	...
Penang ...	2,405	4,953	12	14	93	79	429	2,129	10,627	10,627	63,458		Nil		Nil	2,676	5,148	13	...	...
Singapore ...	4,798	28,472	282	137	791	41	294	8,155		53,081		14,738		93,807		3,733	29,053	241	24	124
Labuan ...	...	43	Nil	Nil	Nil	9	59	41		240		Nil		Nil		...	49	Nil	...	...
Total Straits Settlements ...	7,203	38,253	2,385	1,724	8,964	952	4,530	10,325	10,627	64,248	63,458	22,909	Nil	145,586	Nil	6,409	38,154	2,471	24	124
Total Malaya ..	7,203	52,003	26,430	21,404	111,849	8,077	53,600	10,325	10,637	64,248	63,563	38,245	10,255	238,191	58,581	6,409	51,767	27,860	41	199

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
22	23	24	25	26	27	28
DRY RUBBER	7,859	27,819	4,997	3,644	3,041	180
WET RUBBER	1,053	1,234	151	324	642	143
TOTAL ..	8,912	29,053	5,148	3,968	3,683	323

TABLE III
FOREIGN EXPORTS

PORTS	For month	Jan. to May 1938
29	30	31
Singapore ...	24,270	157,008
Penang ...	9,362	57,434
Port Swettenham.	4,363	22,715
Malacca ...	250	1,034
MALAYA ...	38,245	238,191

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	Jan. to May 1938
32	33	34
Malay States ...	25,565	150,830
Straits Settlements	2,431	12,931
MALAYA ...	27,997	163,761

Notes:—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained
2. The production of estates of less than 100 acres is estimated from the formula: Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month. + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [20] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Columns (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cess paid.
5. All statements are brought up to date monthly, and any inaccuracies that may be disclosed are corrected in the totals; the latest publication therefore, is always the most reliable.
6. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S and F.M.S., at Singapore on 22nd June, 1938

METEOROLOGICAL SUMMARY, MALAYA, MAY, 1938.

Locality	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes						Total.		Most in a day.	Number of days.					Total.	Daily Mean.	Per cent.
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						hrs.	hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	90.3	73.3	81.8	94	71	80	76	84.7	85.5	5.32	135.1	1.03	18	11	6	1	1	166.35	5.37	44
Bukit Jeram, Selangor ...	89.0	73.3	81.1	91	70	78	76	85.1	86.7	1.90	48.3	0.58	10	10			2	209.10	6.75	55
Sitiawan, Perak ...	90.3	74.0	82.1	94	72	87	76	85.3	85.7	7.62	193.5	2.67	15	11	3			202.05	6.52	53
Ipoh Aerodrome, Perak ...	91.0	73.9	82.5	96	71	88	76	84.7	85.1	6.57	166.9	1.55	17	14	8			206.90	6.67	55
Temerloh, Pahang ...	90.3	73.6	81.9	94	71	86	76	87.2	87.4	6.64	168.7	1.04	17	13	5	2		170.25	5.49	45
Kuala Lipis, Pahang ...	90.4	72.5	81.5	94	70	85	74	85.3	85.8	4.17	105.9	1.23	17	13	5	14		180.95	5.84	47
Kuala Pahang, Pahang ...	87.5	74.7	81.1	90	71	82	78	86.0	87.6	6.86	174.2	2.11	19	14	6			221.95	7.16	58
Kallang Aerodrome, S'pore ...	86.7	75.6	81.1	90	73	82	79	83.1	83.8	9.61	244.1	1.78	19	16	9		4	178.05	5.74	47
Bayan Lepas Aerodrome Penang ...	88.2	75.2	81.7	92	73	82	78	84.9	85.3	10.41	264.4	3.03	18	16	6		1	221.40	7.14	58
Bukit China, Malacca ...	86.4	74.4	80.4	90	71	83	77	84.6	85.3	3.39	86.1	0.81	13	9	6		4	199.95	6.45	53
Kluang, Johore ...	89.4	72.4	80.9	93	70	78	75	83.0	83.4	14.90	378.5	2.74	21	15	7	5	1	167.70	5.41	44
Bukit Lalang, Mersing, Johore	87.8	72.9	80.3	92	70	78	75	83.7	83.1	7.04	178.8	1.05	18	16	2		1	205.30	6.62	54
Alor Star, Kedah ...	88.6	74.9	81.7	92	72	82	78	85.7	86.5	6.28	159.5	1.30	17	14	1			208.80	6.67	54
Kota Bahru, Kelantan ...	89.9	74.5	82.2	93	73	85	77	85.5	85.6	6.13	155.7	1.60	15	11	2			218.30	7.04	51
Kuala Trengganu, Trengganu	89.6	73.6	81.6	93	71	83	76	86.1	86.5	4.61	117.1	2.26	13	10	5			238.75	7.70	63
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft.	74.7	63.7	69.2	78	61	70	65	72.6	72.9	11.51	292.4	1.26	23	22	9	9	3	144.05	4.65	38
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	73.9	58.6	66.2	77	54	71	63	71.1	70.9	6.59	167.4	1.82	24	20	4	1		127.00	4.10	33
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	73.6	60.7	67.1	77	58	69	63			6.45	163.8	2.02	23	20				138.40	4.46	36

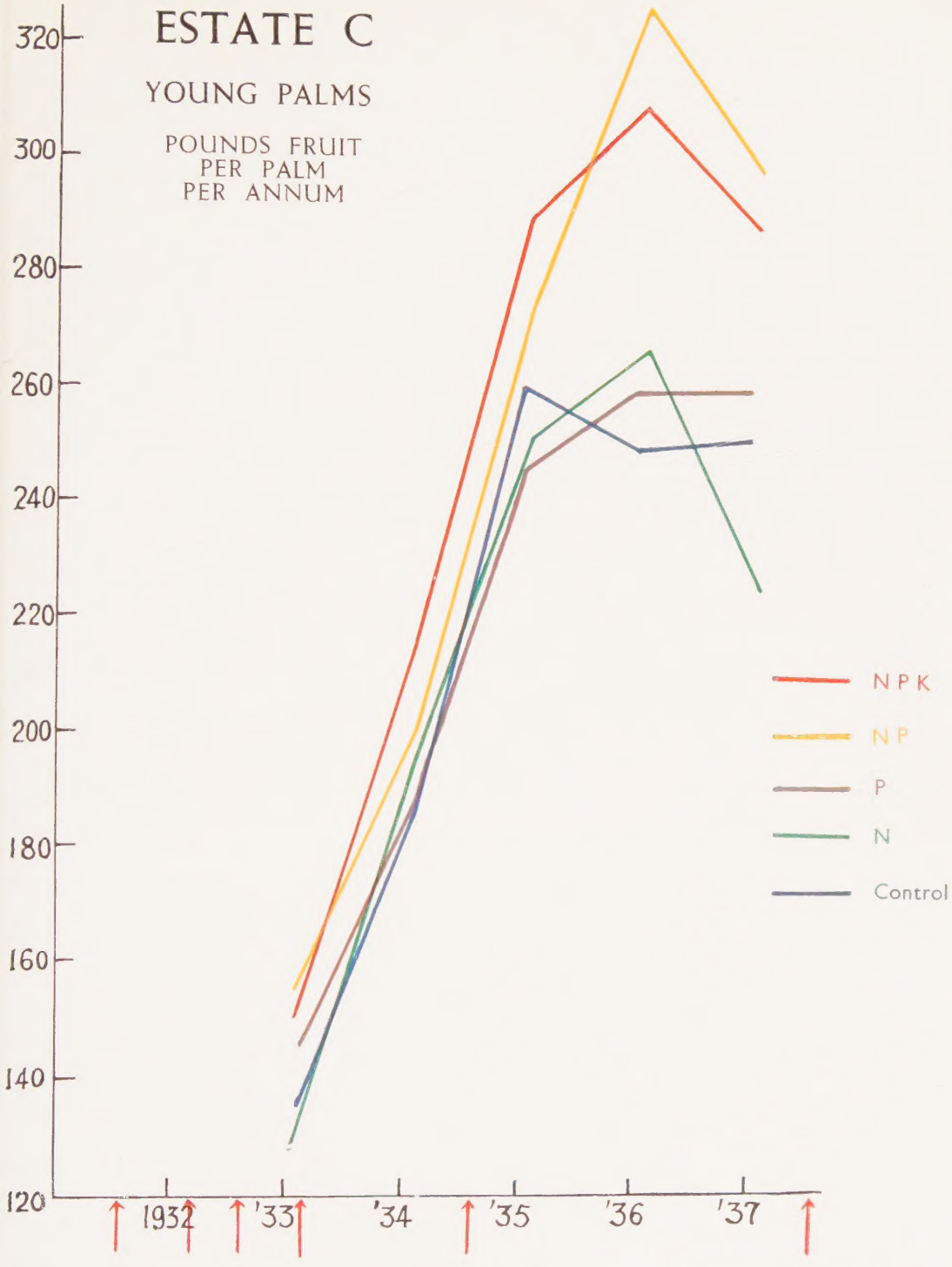
Compiled from Returns supplied by the Meteorological Branch, Malaya.

OMISSION

These three graphs illustrate the article on Manurial Experiments on Oil Palms, by the late Mr. J. H. Dennett included in *The Malayan Agricultural Journal,* July, 1938.

ESTATE A

POUNDS FRUIT
PER PALM
PER ANNUM
N P K
PK
Control
P
1929
'30
'31
'32
'33
'34
'35
'36
'37


ESTATE C
YOUNG PALMS
POUNDS FRUIT
PER PALM
PER ANNUM
320
300
280
260
240
220
200
180
160
140
120
1932
'33
'34
'35
'36
'37
N P K
N P
P
N
Control

SERDANG 5D

POUNDS FRUIT PER PALM PER ANNUM